TABLE 10-07
ENTRANCE LOSS COEFFICIENTS

This table shows values of the coefficient K_i to apply to the velocity head $V^2/2g$ to determine the loss of head at the entrance of a structure such as a culvert or conduit, operating full or partly full with control at the outlet.

Entrance head loss $H_i = K_i V^2/2g$

TYPE OF STRUCTURE AND DESIGN OF ENTRANCE	COEFFICIENT, K_i
A. Concrete Pipe	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, square cut end	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.2
Square-edge	0.5
Rounded (radius = D/12)	0.2
Mitered to conform to fill slope	0.7
End-section conforming to fill slope *	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side or slope-tapered inlet	0.2
B. CMP or CMPA	
Projecting from fill (no headwalls)	0.9
Headwall or headwall and wingwalls	
Square-edge	0.5
Mitered to conform to fill slope	0.7
End-section conforming to fill slope *	0.5
C. Concrete Box	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension, or beveled edges on 3 sides	0.2
Wingwalls at 30 - 75 degrees to barrel	
Square-edged at crown	0.4
Crown edge rounded to radius of 1/12 barrel dimension, or beveled top edge	0.2
Wingwalls at 10 - 25 degrees to barrel	
Square-edged at crown	0.5
Wingwalls parallel (extension of sides)	
Square-edged at crown	0.7

***NOTE**: "End sections conforming to fill slope," made of either metal or concrete, are the sections commonly available from manufacturers. From limited hydraulic tests they are equivalent in operation to a headwall in both inlet and outlet control.